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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
AKRAM, IMRAN	

ART UNIT	PAPER NUMBER
1795	

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03/30/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/801,740	KEEGAN ET AL.	
	Examiner	Art Unit	
	IMRAN AKRAM	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 December 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 12/8/08 have been fully considered but they are not persuasive. The reference rejections still apply. They have been modified due to amendment.

2. In regards to the rejection of claims 6 and 7 over Yamaoka, Applicant asserts that Yamaoka does not disclose the dependence upon catalyst temperature. As shown in the rejection below (and alluding to paragraph 2), the Yamaoka reference recognizes the importance of catalyst temperature for the reaction: it cannot occur below the activation temperature. Also in paragraph 2, Yamaoka discloses that a detector of that temperature is inherent. In paragraph 50, Yamaoka discloses that catalyst temperature is considered when calculating temperature targets and times. Thus, Applicant's assertion on page 15 of the Arguments that "there has been no evidence to conclude that the Yamaoka reference discloses a fuel combustion time interval that is dependent upon a starting temperature of a catalyst within the reformer" is false. Note also that the arguments presented are to the claims as amended, not those previously presented.

3. Applicant asserts on page 16 of the Arguments that "the Dalla reference does not teach or suggest the step of determining a starting temperature of a catalyst in a catalytic reformer as set forth in claim 1." Examiner respectfully disagrees. The Dalla Betta reference explicitly discloses the measuring, compensating for, and changing of the catalyst temperature for the reformation/combustion processes (paragraph 64). Curve **408** of Figure 4 shows a temperature vs. time graph for the catalyst (paragraph

55). Paragraph 105 discloses specifically how temperature of the catalyst relates to the time for combustion.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-5 and 10-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dalla Betta (US 2003/0101713) in view of Yamaoka (US 2002/0071974).

8. Regarding claims 1, 2, 10, 11, 15, and 16, Dalla Betta discloses the use of fuel type, flow rate, catalyst mass, heat of combustion, and initial temperature of said catalyst (paragraph 105) and other system constants (see paragraph 78 for heat capacity of the reformer mass) for use in length of time for fuel processing (paragraph 101) and preheating to a minimum reforming temperature (paragraph 52). And while Dalla Betta discloses the use of control systems, the reference does not disclose the details of a software construct, a computing system, or computer readable medium.

9. Yamaoka discloses a fuel reforming apparatus with an electronic control module for controlling the flow of hydrocarbon fuel and air into the reformer and pre-heating from a starting temperature to a minimum reforming temperature (paragraph 10). Yamaoka discloses the use of a microcomputer (paragraph 39). Software constructs including algorithms, code modules, and interface specifications are inherent to all computers, as are the computer readable medium located within them and with which they function. Computers and their inherent software constructs are the most common methods for control in the art. Yamaoka does not explicitly disclose determining a fuel combustion time interval for the pre-heating. However, given that a target temperature setting means and quantity determinator is disclosed by Yamaoaka (paragraph 15) and

time is measures (figure 6), it would have been obvious to one having ordinary skill in the art at the time of invention to measure the time necessary heating the raw fuel to a reformer temperature in Dalla Betta using the computer of Yamaoka to compensate for the time necessary for the process to occur given the quantity of fuel used and target temperature desired via Yamaoka.

10. Regarding claims 3, 4, 12, 13, 17, and 18, Dalla Betta does not disclose the specifics of the function involving the various parameters. Yamaoka, however, discloses a linear function of temperature and flow rate (see figure 2) where y is the target temperature (combustion temperature) and b is the starting temperature (y-intercept). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a software construct with a linear form since the heat of combustion and heat capacity and mass of the catalyst are all constant: If m is an integral of a product of the latent heat of combustion of said fuel times the selected flow rate of said fuel, divided by a product of the mass of said reformer to be heated times the heat capacity of said mass, the integral of these values with the flow rate of the combustion fuel is equal to the product of the latent heat of combustion divided by a product of the mass of said reformer to be heated times the heat capacity of said mass times the integral of the flow rate with respect to time (it is the only variable related to time). This also gives an x value that is the quantity of raw fuel flow, as the graph of figure 2 is labeled. The use of these variables as products and dividends as a slope converts the units of flow rate to the units of temperature with a value dependent upon the specific values of the gas and catalyst—obvious to a person of ordinary skill.

11. Regarding claims 5, 14, and 19, Dalla Betta discloses a reforming temperature of about 500°C (paragraph 54).

12. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaoka (US 2002/0071974).

13. Regarding claim 6, Yamaoka discloses a fuel reforming apparatus with an electronic control module for controlling the flow of hydrocarbon fuel and air into the reformer and pre-heating from a starting temperature to a minimum reforming temperature (paragraph 10). Yamaoka does not explicitly disclose determining a fuel combustion time interval for the pre-heating. However, given that a target temperature setting means and quantity determinator is disclosed by Yamaoaka (paragraph 15), time is measured (figure 6), and the importance of the catalyst temperature is recognized (paragraph 2), it would have been obvious to one having ordinary skill in the art at the time of invention to measure the time necessary heating the catalyst to a reformer temperature to compensate for the time necessary for the process to occur given the quantity of fuel used, the target temperature desired, and the activation temperature of the catalyst.

14. Regarding claim 7, Yamaoka discloses the use of a microcomputer (paragraph 39). Software constructs including algorithms, code modules, and interface specifications are inherent to all computers.

15. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaoka as applied to claim 6 above, and further in view of Dalla Betta.

16. Yamaoka discloses a linear function of temperature and flow rate (see figure 2) where y is the target temperature (combustion temperature) and b is the starting temperature (y-intercept). Yamaoka does not, however, disclose the details of the slope. Dalla Betta discloses the use of fuel type, flow rate, catalyst mass, heat of combustion, and initial temperature (paragraph 95) and other system constants (see paragraph 78 for heat capacity of the reformer mass) for use in length of time for fuel processing (paragraph 101). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a software construct with a linear form since the heat of combustion and heat capacity and mass of the catalyst are all constant: If m is an integral of a product of the latent heat of combustion of said fuel times the selected flow rate of said fuel, divided by a product of the mass of said reformer to be heated times the heat capacity of said mass, the integral of these values with the flow rate of the combustion fuel is equal to the product of the latent heat of combustion divided by a product of the mass of said reformer to be heated times the heat capacity of said mass times the integral of the flow rate with respect to time (it is the only variable related to time). This also gives an x value that is the quantity of raw fuel flow, as the graph of figure 2 is labeled. The use of these variables as products and dividends as a slope converts the units of flow rate to the units of temperature with a value dependent upon the specific values of the gas and catalyst—obvious to a person of ordinary skill.

17. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaoka as applied to claim 6 above, and further in view of Grieve (US 2002/0150532).

18. Yamaoka discloses the use of a fuel cell, but does not disclose a solid oxide fuel cell. Grieve, however, does (paragraph 4). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a solid oxide fuel cell with Yamaoka as it would be capable of the same function as Yamaoka and is a common type of fuel cell readily available in the art.

Conclusion

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IMRAN AKRAM whose telephone number is (571)270-3241. The examiner can normally be reached on 10-7 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

IA

/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1795